

**What is claimed is:**

1. A system for soldering and emitting inert gas, the system comprising  
a soldering tip;  
a heater cartridge adapted to couple to the soldering tip at its top end, and a channel formed within the heater cartridge between an input opening and an output opening which are separated from each other along an axial direction of the heater cartridge;  
a gas injector adapted to couple to the heater cartridge and provide gas through the input opening of the heater cartridge; and  
an exhaust pipe adapted to enclose at least a portion of the heater cartridge to provide a gas passage.
2. The system according to claim 1, further including a mounting part coupled to the heating cartridge between the input opening and the output opening, where the mounting part is adapted to couple to the exhaust pipe.
3. The system according to claim 1, further including a heating part, where the soldering tip is adapted to receive the heating part at least partially within the soldering tip.
4. The system according to claim 2, further including a box nut, where the exhaust pipe includes an inner pipe with a flange adapted to receive the heater cartridge, and the box nut is movably fitted over an outer periphery of the inner pipe and couple with the mounting part to couple the inner pipe with the mounting part.
5. The system according to claim 1, further including a box nut and the exhaust pipe has a base end formed with a flange part oriented diametrically outward, where the box nut engages with the flange part to couple the exhaust pipe to a mounting part.
6. The system according to claim 1, further including a grip handle adapted to receive the heater cartridge and held in a position between input and output openings.
7. The system according to claim 1, where the exhaust pipe includes an outer pipe and the soldering tip projecting through the outer pipe forming the outlet between the soldering tip and the outer pipe.
8. The system according to claim 1, where the gas injector has a gas chamber adapted to receive the heater cartridge so that the input opening is within the gas chamber, where the gas injector further has a mounting opening that provides a passage between a gas introducing member and the gas chamber so that gas can be provided through the input opening of the heater cartridge.

9. The system according to claim 8, where the gas chamber is between sealing members so that gas can only pass through the input opening of the heater cartridge.

10. The system according to claim 1, further including a temperature sensor disposed within the soldering tip to measure the temperature of the soldering tip.

11. The system according to claim 1, where the heater cartridge has a plurality of annular connection terminals near the base end of the heater cartridge.

12. The system according to claim 1, further including a handle base adapted to receive the base end of the cartridge heater, and two connection pieces whose top ends are bent diametrically inward in the handle base so that as the heater cartridge is inserted into the handle base, parts of the connection pieces are pushed and widened radially outward to make an electrical connection.

13. The system according to claim 1, further including a grip handle adapted to receive the heater cartridge, and a mounting part coupled to the heating cartridge to stop the base end of the heater cartridge from being inserted into the grip handle at a predetermined position along the axial direction of the heater cartridge.

14. The system according to claim 2, further including plurality of projections between the base end and the mounting part of the heater cartridge, where the diameter of the projections are substantially the same as the inner diameter of a grip handle adapted to receive the heater cartridge

15. The system according to claim 14, where the grip handle is formed from elastic material.

16. The system according to claim 1, further including a grip handle for holding the heater cartridge, where the grip handle includes an inner cylindrical body which comes into contact with the heater cartridge, and an outer cylindrical body for covering the inner cylindrical body, where the two cylindrical bodies are made of material having low thermal conductivity.

17. The system according to claim 1, further including a grip handle for holding the heater cartridge, where the grip handle includes a plastic inner cylindrical body which comes into contact with the heater cartridge, and an elastic polymer outer cylindrical body for covering the inner cylindrical body, where the outer cylindrical body is replaceable with color coded body.

18. The system according to claim 1, further including a handle base adapted to receive the based end of the heater cartridge.

19. The system according to claim 18, where the handle base is divided into a first part and a second part.

20. The system according to claim 18, where the gas injector is mounted to the handle base.

21. The system according to claim 18, where the second part of the base handle includes a grounding terminal, a first terminal, and a second terminal, where the grounding terminal extends toward the top end and electrically connected to the annular conductive member, a part of the grounding terminal in its circumferential direction is notched and the grounding terminal is pushed and widened by the inserted heater cartridge.

22. The system according to claim 27, where the first terminal and the second terminal are embedded in a conductive part disposed in the handle base, and the first terminal and the second terminal are plate materials whose top ends are bent diametrically inward, where one of the plate materials is shorter than the other plate material.

23. The system according to claim 27, where the first terminal and the second terminal are embedded in a conductive part disposed in the handle base, and the first terminal and the second terminal are plate materials whose top ends are bent diametrically inward such that as the heater cartridge is inserted, the top ends of the plate materials come into contact with an outer periphery of the heater cartridge and are pushed back diametrically outward.

24. A cartridge-type soldering iron comprising:

a heater cartridge having a top end and a base end, and an input opening and an output opening separated from each other along an axial direction of the heater cartridge, and a channel formed within the heater cartridge between the input and output openings;

a gas injector having a gas chamber, where the heater cartridge is within the gas chamber to provide gas through the input opening in the heater cartridge; and

an exhaust pipe enclosing at least a portion of the top end of the heater cartridge to provide a gas passage.

25. The cartridge-type soldering iron according to claim 24, further including a soldering tip coupled to the top end.

26. The cartridge-type soldering iron according to claim 24, where the exhaust pipe includes an outer pipe and an inner pipe having a flange at least partially within the outer pipe.

27. The cartridge-type soldering iron according to claim 26, where the outer pipe is tapered to form an outlet for gas between the top end and the outer pipe.

28. The cartridge-type soldering iron according to claim 24, further including a box nut having a nut opening adapted to receive the exhaust pipe, and further including a mounting part coupled to the heating element along a predetermined axial location, where the box nut is coupled to

the mounting part to engage the flange of the exhaust pipe to the mounting part to provide a gas passage between the inner pipe and the outer surface of the heater cartridge.

29. The cartridge-type soldering iron according to claim 24, further including a mounting part coupled to the heating cartridge between the input opening and the output opening, where the mounting part is adapted to couple to the exhaust pipe to form a gas passage between the heater cartridge and the exhaust pipe.

30. The cartridge-type soldering iron according to claim 24, further including a soldering tip and a heating part, where the soldering tip is adapted to coupled to the top end and is adapted to receive at least a portion of the heating part.

31. The cartridge-type soldering iron according to claim 29, further including a box nut, where the exhaust pipe includes an inner pipe with a flange adapted to receive the heater cartridge, and the box nut is movably fitted over an outer periphery of the inner pipe and couple with the mounting part to couple the inner pipe with the mounting part.

32. The cartridge-type soldering iron according to claim 24, further including a box nut and the exhaust pipe has a base end formed with a flange part oriented diametrically outward, where the box nut engages with the flange part to couple the exhaust pipe to a mounting part.

33. The cartridge-type soldering iron according to claim 24, further including a grip handle adapted to receive the heater cartridge and held in a position between input and output openings.

34. The cartridge-type soldering iron according to claim 24, where the grip handle is replaceable.

35. The cartridge-type soldering iron according to claim 24, where the exhaust pipe includes an outer pipe and the soldering tip projects through the outer pipe forming the outlet between the soldering tip and the outer pipe.

36. The cartridge-type soldering iron according to claim 24, where the gas injector has a gas chamber adapted to receive the heater cartridge so that the input opening is within the gas chamber, where the gas injector further has a mounting opening that provides a passage between a gas introducing member and the gas chamber so that gas can be provided through the input opening of the heater cartridge.

37. The cartridge-type soldering iron according to claim 24, where the gas chamber is between sealing members so that gas can only pass through the input opening of the heater cartridge.

38. The cartridge-type soldering iron according to claim 24, further including a soldering tip

having a temperature sensor disposed within the soldering tip to measure the temperature of the soldering tip.

39. The cartridge-type soldering iron according to claim 24, where the heater cartridge has a plurality of connection terminals near the base end of the heater cartridge.

40. The cartridge-type soldering iron according to claim 24, further including a base handle adapted to receive the based end of the heater cartridge and make electrical connection to the plurality of connection terminals of the heater cartridge.

41. A method for soldering through a tip and emitting gas near the tip, this method comprising:

- injecting gas into a heater cartridge having a tip end;
- passing the gas towards the tip end through the opening within the heater cartridge;
- passing the gas from within the heater cartridge to the outer surface of the heater cartridge towards the tip end; and
- emitting the gas near the tip end of the heater cartridge.

42. The method according to claim 41, further comprising:  
providing power to the tip end of the heater cartridge.

43. The method according to claim 41, further comprising:  
insulating the heater cartridge to handle the soldering iron.

44. The method according to claim 41, further comprising:  
controlling the gas emitting near the tip end of the heater cartridge.